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PAPER I. PAPER IN THE IRANIAN WORLD PRIOR TO PRINTING

PAPER

i. Paper in the Iranian World Prior to Printing

Paper (*kāḡaḏ*) is a mat of cellulose fibers that have been beaten in the proximity of water and then collected on a screen and dried. The fibers can come from many different kinds of plants or waste such as rags, old ropes, and nets. The wet fibers are either pounded in a hammer mill or ground under millstones; the resulting "stuff" is suspended in water, collected on a screen, turned out, and dried. In Iran, the sheets of paper are usually then sized with starch and burnished to produce fine sheets of extraordinary smoothness, perfect for the sweeping lines of *nasta'liq* calligraphy.

Paper was invented in China in the centuries before the Christian era and carried by Buddhist monks and missionaries throughout East, South, and Central Asia in the period before the coming of Islam in the 7th century CE, but the origins of paper in Iran are shrouded in legend. There is no hard evidence to suggest that the Sasanians either knew of or used Chinese paper, despite unsubstantiated accounts of its use that have been repeated in the literature. Similarly, the introduction of paper to Iran and the Islamic lands is repeatedly

(but erroneously) ascribed to the purported capture of Chinese papermakers following the battle of Talas (Ṭarāz) in 134/751. Yet this charming story, first reported by ʿAbd-al-Malek Moḥammad Ṭaʿālebi (d. 429/1038; p. 140) is unlikely to be true (Tsien, pp. 295-96 and n. e): By the 8th century, Chinese paper was normally made entirely from bast (i.e., plant) fiber, such as the inner bark of the paper-mulberry, while papermakers in arid Central Asia, where paper-mulberry was not cultivated, had presumably perfected the production of paper from flax, cotton, or such waste materials as old rags and ropes. Consequently, rag, not bast, paper would be characteristic of papers produced in the Islamic lands for centuries. Furthermore, there is no historical evidence suggesting that Chinese papermakers needed to have been involved in the technology transfer. On the one hand, paper was already widely known (and presumably manufactured) in Central Asia in the pre-Islamic period; on the other hand, Muslim historians tended to ascribe historical developments to the responsible acts of individual actors. In any event, with the coming of Islam, the use and manufacture of paper, which had been previously unknown, quickly spread from Central Asia to Iran and thence throughout the Islamic lands. By the end of the 8th century, it was manufactured in Baghdad, by the end of the 9th century it was made in Egypt, and by the end of the 10th century it was used in the Iberian Peninsula, transforming the emerging Islamic civilization in its wake (Bloom, 2001).

Although paper had been introduced to the Islamic lands through Central Asia and Iran, little direct evidence survives for its use there in the first three centuries of Islamic period, and the history of its production and use must be pieced together from disparate sources. Unlike arid Central Asia, conditions in Iran are generally not favorable to the preservation of fragile organic materials. A fragment of paper inscribed in Judeo-Persian around the year 718 was obtained by Aurel Stein (1862-1943) from Dandān Öilïq in Chinese Turkestan in the early 20th century (Margoliouth, pp. 737-46, 747-48), one of many bits of evidence for the widespread use of paper by merchants and missionaries throughout Central Asia in the pre-Islamic period. Iranian Muslims seem to have adopted paper initially for keeping records and only gradually began to use it instead of parchment for the copying of books, particularly the Qorʾan.

By the 10th century, Iranian scribes were using paper to copy manuscripts in the Arabic language and script. The oldest dated Qorʾan manuscript on paper known to survive was copied by ʿAli b. Šāḏān Rāzi in 361/971-72. Fifteen years

later, the same scribe copied a book on grammarians of Baṣra, *Ketāb aḵbār al-naḥwiyin al-baḥriyin* by Abu'l-Saʿid Ḥasan Sirāfi (d. 368/979), in a combination of the broken cursive and other more rounded scripts. While there is no indication where this calligrapher worked, an anonymous calligrapher is known to have transcribed another copy of the Qorʾan at Isfahan in Ramażān 383/October-November 993, and, from the 11th century, manuscripts of the Qorʾan produced in Iran were copied on paper rather than parchment, with consequent changes in script. The oldest surviving paper manuscript in the Persian language is believed to be a 447/1055 copy of a treatise on medicinal plants, *Ketāb al-abnia ʿan ḥaqāʾeq al-adwia*, composed a century earlier by Mowaffaq b. ʿAli Heravi (now in the Austrian National Library, MS A.F.340; facsimile ed., Vienna, 2009; Porter, 1994, p. 14; Duda, pp. 51-52).

Medieval Persian authors mention papers of different qualities and types, as well as professions and locations associated with papermaking (*kāḡaḏgari*; Afšār, 1995; idem, 1998, pp. 263-70). In the 10th century, the scholar Ebn al-Nadim (pp. 22-23, tr. Dodge, pp. 39-40, tr. Tajaddod, p. 36; Afšār, 1998, pp. 254-55) had noted that the province of Khorasan was a center of papermaking, and the anonymous Persian author of the geographical work *Ḥodud al-ʿālam*, begun in 372/982-83, states that a monastery (*ḵānagāh*) of Manichaeans in Samarqand made paper that was exported throughout the [Muslim] world **(**pp. 107-8, tr. p. 113**).** In the 11th-century, Abu'l-Ḥasan Hojviri (apud Porter, 1994, p. 17) mentioned that sheets of old manuscripts were used as linings for hats or as pasteboard for bookbinding, which indicates that old paper remained a valuable commodity. By the 11th century, papermaking must have been common enough for the Persian poet Manučheri (d. ca. 432/1041; p. 67) to expect that his readers would understand his likening of the snow-covered desert to a paper-workshop:

> *Čonān kārgāh-e Samarqand šod*; / *Zamin az dar-e Balḵ tā Ḵāvarān.*
> *Dar-o bām-o divar-e ān kārgāh*; / *Čonān zangiānand* [*rangiānand*?]
> *kāḡaḏgarān.*
>
> The land from Balkh to Ḵāvarān has become like the workshop of Samarqand;
> The doors, roof, and walls of that workshop are like [dyers?] and paper-makers.

alluding to how papermakers spread the damp sheets of white paper on the ground to dry, as is still done today in rural China (for textual sources, see Porter 1994, pp. 16-28; Afšār, 1995; idem, 1998, pp. 252-53).

Rašid-al-Din Fażl-Allāh (d. 718/1318), celebrated vizier and historian of the Il-Khanid period, was open to other papermaking traditions. Based on the information given in his treatise on agriculture, he brought Chinese artisans to work at his paper-mill in Rabʿ-e Rašidi, the charitable foundation he had established in an eastern suburb of Tabriz. From the Chinese, Rašid-al-Din learned about making paper from the bark of the paper-mulberry bark, how the Chinese normally wrote on only one side of the paper, and how they wrapped many goods in paper (Rašid-al-Din, pp. 37, 87; Afšār, 1998, pp. 251, 253-54, 255). Māfarroḵi's late-11th-century Arabic text about the wonders of the city of Isfahan, which was reworked into Persian in the 14th century, mentions that paper of the *rašidi* type, presumably similar to that made for Rašid-al-Din, was made there as well (tr., p. 138). The text praised this *rašidi* paper, which he used for copying literary works and reviving the books of the great scholars of the past (Afšār, 1995, p. 80; idem, 1998, p. 253). The profligate use of big sheets of paper was a prerogative of power. Both the Il-khan Uljāytu (r. 703-17/1304-17) and his vizier Rašid-al-Din consistently preferred that their scribes use high-quality paper in ostentatiously large sizes and quantities. In addition to ordering copies of the Qorʾan and the Hadith, the vizier ordered that every year the resident scribes should use large sheets of good *bāḡdādi* paper to prepare copies of his own literary work, the *Jāmeʿ al-tawāriḵ*, in Arabic and Persian (Blair, 1984, p. 81). Several of Rašid-al-Din's manuscripts have survived. The single surviving volume, dated Ṣafar 751/April 1315, from a thirty-volume Qorʾan manuscript (Istanbul, Topkapı Palace Library, EH 248; see James, 1988, cat. no. 46), measures 52×37 cm, implying a sheet size at least 52×74 cm and equivalent to the "half-*bāḡdādi*" sheet. The pages of the Arabic copy of the *Jāmeʿ al-tawāriḵ* now measure 43×30 cm, but the margins have been trimmed, perhaps by more than 3 cm from each side. The original sheets would then have measured at least 50×36 cm, corresponding to the same half-*bāḡdādi* size (Blair, 1995, pp. 38-39; Baker 1991). The Persian version of the same text preserved in Istanbul was copied on sheets measuring 54-56×76-78 cm, the slightly larger dimensions suggesting that the manuscript had been rebound fewer times and consequently trimmed less. A copy of Rašid-al-Din's theological works, *Majmuʿa al-rašidiya*, originally measured 50×37 cm (Paris, Bibliothèque Nationale, MS arabe 2324), and an anthology of poetry associated with the *Rašidiya* scriptorum (London, India Office Library, Ethé, 903, 911, 913

and 1028) was written on the same large sheets.

The preference for ostentatiously large sheets continued after Rašid-al-Din was put to death in 718/1318. The pages of the dispersed Great Mongol *Šāh-nāma*, which has been associated with the patronage of Rašid-al-Din's son Ḡiāṯ-al-Din Moḥammad about two decades later (ca. 1330-35) at the revived Rašidiya scriptorium, were similarly large. The manuscript has been extensively refurbished and the individual pages have been re-margined in the 19th century, but as the text panels themselves measure 40×29 cm, the original pages must have been at least half of the *bagdādi* size, if not somewhat larger. In preparation for calligraphy and painting, the pages of this manuscript had been heavily burnished, leaving the sheets with smooth surfaces but poor internal cohesion. This quality allowed unscrupulous dealers in the early 20th century to split pages with paintings on both sides and sell them separately (Grabar and Blair, pp. xi, 6-7; Bloom).

The collapse of the Il-Khanids in mid-14th century meant that few patrons were able or willing to commission manuscripts of such generous proportions, and some papermakers, like calligraphers and other artists, probably migrated from Iran and Iraq to such intellectual centers as Cairo and Damascus, where they put their talents to work preparing manuscripts for the Mamluk amirs. Nevertheless, in the late 14th and 15th centuries, papermaking, as well as all the other arts of the book, was again transformed by the patronage of Timur (r. 771-807/1370-1405) and his successors. For his new congregational mosque in Samarqand, Timur probably commissioned the largest Qurʾān manuscript produced in medieval Iran and Central Asia; his grandson Ulug̃ Beg (r. 850-53/1447-49) commissioned a great stone lectern, measuring more than two meters square and nearly as high, to hold this gargantuan manuscript (Soudavar, p. 59). Judging from the surviving pages and fragments, each page originally measured 2.2×1.55 meters, or eight times larger than the full-*bagdādi* size. The size of the sheets required that the paper be heavier and stronger than usual, so that it would not tear when the leaves were turned. To judge from the surviving pages, which have seven lines of text on only one side of the page, a complete Qorʾan manuscript would have required some 1600 leaves, or about 2700 square meters of paper. The absence of text on the back of the sheets, which are unusually rough, combined with their unusual thickness, indicates that the papermakers must have resorted to the older process of ladling the pulp into floating molds that rested in shallow basins of water (James, 1995, pp. 18-25; Soudavar, pp. 59-64; Blair and Bloom). Nearly

two centuries later, Timur's mammoth Qorʾan manuscript was attributed by the Safavid chronicler Qāżi Aḥmad to the calligrapher ʿOmar-e Aqṭaʿ ("'Umar the amputee"), who wrote with his left hand. According to the story, after the sultan had rejected the calligrapher's tiny copy of the Qorʾan, he then prepared an enormous one for which the sultan rewarded him "with great honors, marks of respect and endless favors" (Qāżi Aḥmad, tr., p. 64). It is, however, inconceivable that any Timurid calligrapher could have initiated such a project on his own initiative, and the sheer magnitude of the project indicates that it must have been a royal commission from the start.

By the 15th century Iranian papermakers had perfected their art. They could make paper in virtually any desired size, strength, or texture, and calligraphers and painters appreciated the various qualities of different papers which they used in producing some of the most elegant and splendid manuscripts yet made anywhere in the Islamic lands (Lentz and Lowry, esp. pp. 159-236). Technical examination shows that papermakers were able to beat the pulp so thoroughly that the resulting paper had few visible threads. The increased processing gradually allowed them to make thinner and finer sheets without any loss in strength. Although consistency between individual sheets was valued, calligraphers were still prepared to use papers of somewhat varying thickness in a single volume (Wright, pp. 146-49).

That the finest paper for calligraphy and painting should be thin, strong, and sized with rice starch was already mentioned in Jamāli Yazdi's *Farroḵ-nāma* (pp. 327-28), written in 580/1184-85. In the 13th and 14th centuries, thanks to the improvement in the quality of the materials they were using, calligraphers were able to bring their art to new highs, developing exquisite scripts of breathtaking beauty. To create a surface that would allow their reed pens to glide effortlessly across the paper, leaving a flawless trail of ink, calligraphers preferred to glaze their paper by burnishing the already-sized surface with a hard and smooth stone. The great calligrapher Solṭān-ʿAli Mašhadi (d. 926/1520) devoted several couplets of his treatise on calligraphy to the process of glazing paper by hand (Qāżi Aḥmad, tr., p. 114).

In addition to glazing, paper for calligraphy was often tinted. A taste for colored papers had long existed in the eastern Islamic lands. Simi Nišāpuri, a librarian in the city of Mashhad and an expert in the arts of the book in the fifteenth century, wrote that "it is better to give paper a slight tint because white is hard on the eyes and the master calligraphic specimens that have been observed have all been on tinted paper" (Thackston, p. 219). Simi offered

various recipes for dyes. For him, the most popular colors were reddish-yellow, reddish-orange (henna), lime green, pistachio green, and buff. Although, in the era before the discovery of chemical bleach, papermakers were proud of being able to make very white paper, calligraphers seem to have preferred using tinted paper, and the distinct tan or beige tone of many medieval Persian manuscripts may reflect the **t**aste rather than the unwanted effects of age. Surviving manuscripts from the 15th and 16th century include papers in a broad range of colors, including blue, pink, salmon, and pale green, in addition to the more common tans and beige (see Soudavar, passim).

Many calligraphers considered the finest paper to be Chinese (*ḵetāʾi*). Already in the tenth century, Ebn al-Nadim met a bibliophile who collected Chinese paper (Ebn al-Nadim, p. 46, tr. Dodge, p. 89). The 14th-century littérateur and chancellery scribe Moḥammad Hendušāh Naḵjavāni mentions (I/ii, p. 133) sixty sheets of "Chinese" paper among a list of gifts included in the collection of private and official letters he compiled for the Jalayerid ruler Šayḵ Ovays (r. 1356-74; Blair, 2000). The calligrapher Solṭān-ʿAli Mašhadi considered Chinese paper the best for quality and color, and this sentiment was repeated by several contemporary and later poets (Qāżi Aḥmad, tr., p. 113).

Just as *bāḡdādi* paper had become a generic term for fine and large sheets in the 14th century, the term "Chinese" may have taken on a generic meaning. It is sometimes said that Chinese paper was made from silk, but as paper can only be made from cellulose fibers, this cannot be true. Nevertheless, "Chinese" was an expensive type of paper, and some idea of its value is given by a document bearing the name of Solṭān-Ḥosayn Mirzā, ruler of Herat in the late 15th century. The document estimates the expenses for copying a manuscript of the *Šāh-nāma* at 42,450 dinars, of which 12,000 dinars (28 percent) went for "Chinese" paper at 20 dinars a page. The amount of some 15,570 dinars (37 percent) was paid to the calligrapher who got 250 dinars for copying every thousand couplets. The rest of the money went to the illuminators, marginators, and painters (Soucek and Çağman, pp. 200-201). The exact figures cannot be trusted because the document is probably a forgery intended to increase the value of the manuscript at the time it was resold in the 16th century, but the relative percentages must have been reasonable enough to fool the contemporary eye (Blair, 2000). That paper accounted for 28 percent of the manuscript's total cost indicates that the material was still far more expensive than it is today, where the cost of paper is usually an insignificant fraction of a book's total cost.

Chinese paper, which was given a much softer finish because it was prepared for writing with soft brushes, not reed pens, was valued not only for its fine quality, but also for the various decorative treatments Chinese papermakers had developed over the centuries, including dying, sprinkling and painting with gold, and marbling (Tsien, p. 94). Some of these techniques appear in the oldest surviving examples of identifiably Chinese paper used in Persian manuscript, for instance two volumes of Farid-al-Din ʿAṭṭār's poetry, prepared at Herat in 1438 for the library of the Timurid ruler Šāhroḵ (r. 807-50/1405-47). The manuscripts were copied on sheets of thin Chinese paper that had previously been tinted with various colors, sprinkled with gold speckles and painted with gold designs (Lentz and Lowry, no. 39, 40). Another manuscript, a small copy of Mir-Ḥaydar Ḵvārazmi's *Maḵzan al-asrār*, was copied at Tabriz in 1478 by the calligrapher Solṭān-ʿAli Qāʾeni on sheets cut from two Chinese rolls. The light blue dyed paper had been sprinkled with gold flecks, and painted in gold with flowers and birds, as well as landscape scenes (Soucek). Presumably the Persian calligraphers had to size the Chinese papers with starch before beginning to write the Persian verses with a reed pen, unless starch had already been used to make the gold flecks adhere.

Such decorated Chinese papers had probably been brought to Iran as gifts from the numerous embassies exchanged between Timur and his successors and the Ming emperors. For example, a caravan of merchants from the Timurid lands arrived in Nanking in 1413 bearing presents for the Ming emperor Yung-lo. The emperor sent a return mission to Samarqand, which arrived in 1414 bearing gifts of plain and patterned silk. Persian sources mention another Chinese embassy arriving in April 1417 bearing gifts of falcons, brocades, porcelains, and paper (Blair, 2000).

Iranian artisans soon developed their own techniques for speckling and painting paper with gold (*zarafšān*), and this technique became particularly common as collectors developed a taste for binding together specimens of calligraphy, and eventually paintings, in albums. The varying-sized specimens were mounted on standard-size sheets of fancy paper before being bound together in books. Several medieval writers give directions for decorating paper with speckles in sizes ranging from "dust" to "coarse." The paper was first starched, and then sprayed with gold particles, made by grinding pure gold leaf, using either a horsehair brush or sieves of varying degrees of fineness, depending on the effect desired. The paper was then burnished with a hard stone to make the gold adhere and develop its metallic luster. Simi

Nishapuri also gives recipes for making suspensions of gold, silver, bronze, and copper that could be painted on decorative papers (Porter, 1994, pp. 49-51).

Marbling was another Chinese technique adopted and developed by Persian artisans, and marbled papers were used in the same ways as gold-sprinkled ones. As early as the 10th century, Chinese artisans had developed various ways for decorating paper with mottled or marbled designs, to which they gave such colorful names as "fish-eggs notepaper" and "drifting sand notepaper" (Tsien, p. 94). Although no early examples of these papers are known to survive, they were probably brought to Timurid Iran as gifts, for it is at that time that Iranian artisans first developed their own techniques for achieving similar effects. They called this paper *kāḡaḏ-e abri* ("clouded" or "variegated" paper; see Ḏokāʾ; Semsār). The Persian marbling technique was based on suspending ground colors in a medium lighter than water, normally oil. A vat, large enough to hold the sheets of paper, was filled with water that had been thickened with a mucilaginous substance. The colors were then gently poured or dropped at random or in a desired pattern onto the surface of the thickened water, and a sheet of prepared paper carefully laid down. The designs could be infinitely modified with the help of rods or combs to manipulate the colors (Porter, 1994, pp. 45-49; Ḏokāʾ, pp. 374-75). At first the effects were simple, but they became increasingly complicated with patterns and colors. From Iran, the technique of marbling spread to India, Turkey (where it is known as *ebru*), and eventually Europe, where it enjoyed enormous vogue, particularly in the 19th century (Wolfe; Ḏokāʾ, p. 376).

The period between the 13th century and the 16th was remarkable for Iranian papermaking in terms of improvements in quality, size, and decoration. Before the 13th century, books written on paper had been relatively small, indicating that the sheets from which they were made were also small. Before the advent of printing, there would have been no economic advantage to making large sheets of paper, which would then have been cut up into small pages. In addition, the older papers are thicker, softer, and more flocculent (i.e., "fluffy" or "cloud-like"), and have relatively poor internal cohesion. They are usually brownish or tan, not from intentional tinting but from the difficulty of bleaching the fibers. Over the course of the 12th and 13th centuries, however, papers from the eastern Islamic lands became distinctly whiter and finer, and they were, or could be, manufactured in larger sizes. The best quality paper of the 14th and 15th centuries is thinner and stronger

than the one produced earlier, and, for the finest calligraphy and painting, was normally glazed. By the 15th century, the papers used in Iranian books are better than they had ever been before; they are thin, strong, very smooth, and highly polished, allowing artists to use them for the exquisitely delicate calligraphy, illumination, and painting that were characteristic of the period.

The high standard of Iranian papermaking continued into the 16th century, as Safavid patrons continued their predecessors' interest in the arts of the book. By the 18th century, however, the industry had fallen on hard times, as the Indian paper (*kāḡaḏ-e kašmiri*, *dawlatābādi*, *aḥmadābādi*) industry provided stiff competition. Mirzā Rafiʿā's *Dastur al-moluk*, a Safavid work on administration from about 1725, for example, specifies (29a, tr. p. 128) that the chancery secretary receive thirty reams of paper from Dawlatābād in the western Deccan, which had become an important papermaking center (Porter, 1994, p. 17; Premchand, pp. 74-87; for paper names, see Afšār, 1998, pp. 265-69). By the 19th century, Russian and European paper mills were also supplying Iran, since the introduction of lithography demanded large quantities of paper quite unlike those used for the production of manuscripts. Many old manuscripts, including the Great Mongol *Šāh-nāma*, were refurbished using machine-made Russian paper (for the later history of paper in Iran, see "PAPER AND PAPERMAKING").

The introduction and use of paper in Iran had a profound impact on Iranian culture that has scarcely been noticed or appreciated. The widespread use of paper around 1000 coincided with the revival of the New Persian language and the introduction of more fluid scripts for writing Arabic script; the invention and development of the *nastaʿliq* script in the 14th and 15th centuries coincided with the flourishing of paper-based arts of the book and would come to characterize written Persian forever after (Blair, 2006). Other uses of paper are less immediately apparent. The shift from orality to writing in Iranian society, where written texts, deeds, and documents played an increasingly important role, was grounded in the increased availability of paper for writing, as was the quintessentially Iranian arts of the [illustrated] book, which flourished from the 14th century (Bloom, 2006). Iranian artists developed the art of drawing on such media as ceramic bowls and tiles until the 13th century, when they began to work exclusively on paper to produce either finished drawings and paintings or cartoons that other artisans could realize in a variety of media (Bloom, 2000). The increasing uniformity of Iranian architecture in the 15th century was grounded in paper-based plans

and drawings that could be sent from one region to another to insure that builders built according to plan. The glittering webs of tile mosaic that cover many of the finest Iranian buildings were made using an indirect technique based on paper drawings (Bloom, 2006).

All told, the tradition of papermaking in greater Iran between the ninth and the 17th century was the longest and most advanced in any of the Islamic lands. The papers made there, particularly from the late 13th century to the late 16th, were of extraordinary high quality and, when necessary, of great size, and the best papers of the 15th and 16th centuries, which were exceedingly smooth, strong and sometimes remarkably thin, and played an essential role in the florescence of the decorated luxury book as the major art form there. The paper-based arts of calligraphy, rulings, gold-sprinkling design, illumination, illustration, doublures, and binding were symphonically combined in works in which the whole was far greater than the sum of the individual parts.

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